# CITY COUNCIL AGENDA REQUEST FORM

Today's date: 9 / 25 / 17

Date of meeting 10 / 4 / 17

(City Council meetings are held the 1<sup>st</sup> and 3<sup>rd</sup> Wednesday of each month.)

Name of Citizen, Organization, Elected Official, or Department Head making request:  Planning Staff
Address: 1123 Lake Street
Phone number and email address: (208) 263-3370  Authorized by: Aaron Qualls
name of City official  (Department Heads, City Council members, and the Mayor are City officials.)  Subject: ACI Review
Summary of what is being requested: Bonner County is requesting comment on
development which falls within the City's Area of City Impact.
The following information MUST be completed before submitting your request to the City Clerk:  1. Would there be any financial impact to the city? Yes or No  If yes, in what way?
Name(s) of any individual(s) or group(s) that will be directly affected by this action:  Have they been contacted?  Yes or No
3. Is there a need for a general public information or public involvement plan? Yes or No If yes, please specify and suggest a method to accomplish the plan:
4. Is an enforcement plan needed? Yes or No Additional funds needed? Yes or No
5. Have all the affected departments been informed about this agenda item? Yes or No  This form must be submitted no later than 5 working days prior to the scheduled meeting. All pertinent paperwork to be distributed to City Council must be attached

ITEMS WILL NOT BE AGENDIZED WITHOUT THIS FORM



# **Staff Report**

To: City Council From: Planning Staff

Report: September 20, 2017 Meeting: October 4, 2017

Item: ACI REVIEW- ACI17-01 Waster collection site on Upland Drive

# **General Information**

**Applicant:** Bonner County

Requested Action: For a BC operated solid waste collection site on 10.68 acres.

**Purpose:** To replace the current collection site at the same location.

Location: The site is located on Upland Drive, 1 mile west of Sandpoint.

**Size:** Lot: application refers to the site as 8.8 and 10.68 acres.

Buildings: The application states the site will have a 120 sq ft building for an attendant, non permanent buildings, 12 dumpsters and a 100 sq. ft haz

mat shed.

Existing Zoning & Zone: Suburban

Context Area: Context Area:

Surrounding Land North: Productivity forest land,

Use: South: Residential Lot approx. 10 acres

<u>East:</u> Residential Lot approx. 1.5 acres West: Residential Lot approx. 8 acres

**Included in** 1. Staff Overview

**Staff Report:** 2. Relevant Portions of the Comprehensive Plan

3. Conditional Use Permit Criteria

4. Staff & Planning Commission Recommended Conditions

5. Motion for Proposed Decision

**Attached:** 1. CUP Application with supporting materials

2. Planning Commission draft minutes of 9-19-17

# 1. Staff Overview

# **Background:**

The City has received an application for a Conditional Use Permit from Bonner County (see Attachment 1). The application, filed by Bonner County, proposes to replace an existing solid waste collection site with a new facility.

Sandpoint's Area of City Impact Ordinance with Bonner County was first adopted in 1977, and revised in 1994. Under the Ordinance, property within the Area of City Impact boundaries are governed by the County's regulations but the County is required to solicit comments on proposals for development from the City. The site is designated Suburban Growth Area in both the County's Comprehensive Plan and Suburban in the Zoning Ordinance documents. The site is designated Context Area 1 on the City's Comprehensive Plan Map.

# 2. Relevant Portions of the Comprehensive Plan

CA-1 is the lowest intensity development pattern in the Sandpoint plan, characterized as predominantly rural with some farms, a few residences and no service or commercial activity. Because this rural pattern is inconsistent with the vision of a sustainable, compact city, the plan discourages CA-1 areas within city limits. CA-1 is indicated in areas adjacent to "very rural" areas in the ACI, and abutting industrial lands west of the Great Northern tracks near the airport.

# 3. Conditional Use Permit Criteria:

Pursuant to City Code (9-9-6.A.3.h), a Conditional Use Permit application must meet the following standards:

- 1. Will, in fact, constitute a conditional use as established on the official schedule of regulations for the zoning district involved.
- 2. Will be harmonious with and in accordance with the general objectives, or with any specific objective of the comprehensive plan and/or applicable sections of the Sandpoint Code.
- 3. Will be designed, constructed, operated and maintained to be harmonious and appropriate with the existing or intended character of the general vicinity and that such use will not change the essential character of the same area.
- 4. Will not be hazardous or disturbing to existing neighboring uses.
- 5. Will be served adequately by essential public services and utilities such as highways, streets police and fire protection, drainage systems, refuse disposal, water and sewer, and schools; or that the persons or agencies responsible for the establishment of the proposed use shall be able to provide adequately any such service or utility.

- 6. Will not create excessive additional requirements at public cost for public services and utilities and will not be detrimental to the economic welfare of the community.
- 7. Will not involve uses, activities, processes, materials, equipment and conditions of operation that will be detrimental to any persons, property or the general welfare by reasons of traffic, noise, smoke fumes, glare or odors.
- 8. Will have vehicular approaches to the property, which shall be designed so as not to create an interference with traffic on surrounding public roads.
- 9. Will not result in the destruction, loss or damage of a natural, scenic or historic feature of major importance.

Pursuant to City Code (9-9-6A.6), upon granting a Conditional Use Permit, conditions may be attached including, but not limited to, the following:

- 1. Minimizing adverse impact on other developments
- 2. Controlling the sequence and timing of development
- 3. Controlling the duration of development
- 4. Assuring that development is maintained properly
- 5. Designating the exact location and nature of development
- 6. Requiring the provision for on-site or off-site public facilities or services
- 7. Requiring more restrictive standards than those generally required in an ordinance.

# 4. Staff Recommended Conditions

The Planning Commission has recommended City Council advise Bonner County of the following:

1. Service at this location will only include household items.

# 5. Motion for Proposed Decision

"I move Bonner County be advised the City has the following comments on the proposed Conditional Use Permit for County File C1006-17 Bonner County Solid Waste Site: (Insert any comments)

# SANDPOINT PLANNING COMMISSION MEETING 5:30 P.M. CITY HALL COUNCIL CHAMBERS MINUTES OF September 19, 2017

**COMMISSION MEMBERS PRESENT:** Tom Riggs, Yuri Simon, Collin Beggs, Danny Strauss, Tom Russell

**COMMISSION MEMBERS ABSENT:** Cate Huisman, Mark Remmetter

**STAFF MEMBERS PRESENT**: Planning & Community Economic Director Aaron Qualls, City Attorney Scot Campbell, Planner Melissa Bethel (minutes)

Chairman Riggs called the meeting to order at 5:30 p.m.

Matters from the Public: None

# **Approval of the Consent:**

Commissioner Beggs moved and Commissioner Riggs second to approve the minutes of July 18, 2017. **Motion passes unanimously.** 

# ACI17-01 Bonner County Area of City Impact review for a solid waste site on Upland Drive:

# Staff presentation:

Qualls gave a brief overview of the Area of City Impact review and application.

# Discussion:

Chairman Riggs clarified the use will remain the same, but the collection site will increase.

Commissioner Russell stated he is in favor and has no issues with the proposal. Commissioner Strauss inquired what is prompting the review since the facility is already operating. Qualls stated there will be an increase in footprint with some improvements such as paying and additional dumpsters.

David Reseska stated he has used the site for a decade and thinks the expansion will benefit Sandpoint.

#### **Motion:**

Commissioner Russell moved and Commission Beggs second the Sandpoint Planning Commission recommend to the City Council that the Bonner County Planning Department be advised the City has the following comments on the proposed Conditional Use Permit for County File C1006-17 Bonner County Solid Waste Site:

1. Service at this location will only include household items.

# Motion passes unanimously.

# **Matters from Staff:**

ADJOURNMENT: The meeting adjourned at 5:30 p.m.

# Comprehensive Plan Update Workshop 6:00 p.m.

Approximately 60 people attended the workshop which included information regarding the area and a public involvement session designed to identify key priorities for the area.





# BONNER COUNTY PLANNING DEPARTMENT

1500 HIGHWAY 2, SUITE 208, SANDPOINT, ID 83864 (208) 265-1458 (208) 265-1463 (FAX) planning@co.bonner.id.us (e-mail) http://www.co.bonner.id.us/planning/index.html (web page)

# CONDITIONAL USE PERMIT APPLICATION

#### FOR OFFICE USE ONLY:

FILE #

C1006-17

RECEIVED:

RECEIVED

AUU 1 1 2017

BONNER COUNTY

ANNING DEPARTMENT

#### PROJECT DESCRIPTION:

Describe the proposed use:

This application is for a Bonner County-operated solid waste collection site located on a 10.68 +/acre parcel. This solid waste and recycle collection site will be located on a forested parcel and
replace an existing collection site located on the same parcel. Currently, the closest collection site is
approximately 8.5 miles away from this location.

The use is conditionally provided for at Bonner County Revised Code, Section(s) 12-335

#### APPLICANT INFORMATION:

Landowner's name: Bonner County

Mailing address: 1500 Highway 2, Suite 101

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City: Sandpoint State: ID

Telephone: 208.255.5681 Fax: 208.762.9797

E-mail: bob.howard@bonnercountyid.gov

#### REPRESENTATIVE'S INFORMATION:

Representative's name: Brad Marshall Company name: J-U-B ENGINEERS, Inc. Mailing address: 7825 Meadowlark Way

City: Coeur d'Alene

State: ID

Zip code: 83815

Zip code: 83864

Telephone: 208.762.8787

Fax: 208.762.9797

E-mail: bmarshall@jub.com

# ADDITIONAL APPLICANT/REPRESENTATIVE INFORMATION:

Name/Relationship to project: Bob Howard, Solid Waste Director

Company name: Bonner County Public Works Mailing address: 1500 Highway 2, Suite 101

City: Sandpoint

State: ID

Zip code: 83864

Telephone: 208.255.5681

State. 1D

Fax: 208.263.9709

E-mail: bob.howard@bonnercountyid.gov

Honner County Conditional Use Permit Application
J:\Plauning\Administrative\Application Forms\Conditional Use Permit\Conditional Use Permit Application

April 2013 Page 1 of 7

#### PARCEL INFORMATION:

Section #: 20 Township: 57 N Range: 02W Parcel acreage:10.68

Parcel # (s): RP57N02W177075A, PR57N02W202400A

Legal description:

See attached deed.

Current use: Solid Waste Collection Site Current zoning: Suburban

What zoning districts border the project site?

North: S East: S

South: S West: S

Comprehensive plan designation: Suburban Growth Area

Uses of the surrounding land( describe lot sizes, structures, uses):

North: Productivity forest land, approximately 8.525 acres

South: Residential lot, approximately 10 acres

East: Residential lot, approximately 1.5 acres

West: Residential lot, Approximately 8 acres

Nearest city: Sandpoint, Idaho Distance to the nearest city: 2 miles

Detailed directions to site:

US-2 to Pine Street in Sandpoint, west on Pine Street for approximately 2.3 miles, north on Upland Drive for 0.25 miles.

#### ADDITIONAL PROJECT DESCRIPTION:

Please describe in detail all applicable uses/plans for subject property, including:

- 1) Size of buildings: 120 s.f. attendant station
- 2) Type of unit: Collection site buildings will be non-permanent.
- 3) # of Units: 8 cubic-yard dumpsters (approx. 12)
- 4) Any machinery to be located on the site:

Seasonal snow removal equipment may be parked at the collection site.

5) Any storage area, etc.: A small "free items" rack, small area for tires. Hazardous materials such as batteries will be stored in the 100 s.f. haz-mat shed.

6) Phasing plans, expected start-up and completion dates:

The collection site construction is anticipated to start in the fall of 2017.

7) # of people on site (employees, visitors, etc.):

The collection site will have 1 to 2 employees plus an estimated 10 visitors at any one time.

8) Hours of operation:

Collection site open to the public from 7:00 am to 5:00 pm, seven days per week, with major holiday closures.

9) Traffic to be generated (vehicles per day or week):

The collection site anticipates up to 100 vehicles per day in the summer and up to 75 vehicles per day in the winter.

10) Associated functions (receptions, outdoor activities, add The collection site may have a once-per-year household haze important collection service and to educate the public.	litional processes, e irdous waste event	tc.): to promote this
11) Parking, loading areas: Three proposed parking stalls including one handicap stall. site, back up to a dumpster to unload and then leave.	The majority of visit	ors will enter the
12) Advertising sign, size and location: Signs placed along Upland Drive to direct people to the trans at the collection site gates, including but not limited to hour fees, etc. similar to other attendant collection sites.	sfer site. Additional s of operation, holid	signs will be placed lay closures, policies,
13) Lighting plans: Downcast exterior flood lighting will be used to illuminate th that a 30' landscaped buffer is proposed along Upland Drive		
14) Solid waste management plan: Large trash trucks will empty containers and bins when need Transfer Station at Colburn-Culver Road.	ded and haul the so	lid waste to the main
15) Complete detail of scope/process: Customers will arrive with a load and check in with the atter then be directed to the appropriate location to deposit their t household hazardous waste, etc.). Loads not conforming to s Colburn Transfer Station.	trash, recycling, or o	other items (i.e.
16) If required, are landscaping plans attached?	Yes	⊠ No
NARRATIVE STATEMENT:		
How will the conditional use be designed to avoid creatin adjacent to the property?	g hazards or dange	ers to persons on or
The Bonner County Solid Waste Department has not had a sproperty at attended facilities. Bear-resistant dumpsters may enclosed with sight obscuring fence and have an on-site atte	y be used if warrant	ed. The site will be
Explain the effects of elements such as noise, light glare, or property:	dor, fumes and vib	rations on adjoining
The nearest building on adjacent property is approximately 5 site. The collection site will use downcast lighting and have a the front of the collection site along Upland Drive. The collection	30' landscaped but	ffer of trees bordering

How is the proposed use compatible with the adjoining land uses:

collection site is located on the same parcel as the current collection site.

The collection site fits well with the area being adjacent to large, rural residential lots. The buffer of existing trees along the north, west, and south sides of the site will ensure that the site is obscured from adjacent properties. A landscaped buffer of trees along Upland Drive will provide further concealment of the site. Providing a upgraded collection site in the area will reduce the amount of illegal dumping that occurs.

nearest buildings that noise, odors, fumes, and vibrations should not be detected. The proposed

	CCESS INFORMATION: case check the appropriate boxes:
The second below.	Private Easement  Existing Proposed  Describe travel surface (e.g., gravel, dirt, paved, etc.), travel way width, road grade and easement width. Include recorded instrument number for existing easements & name, if existing:
	Public Road
X	Combination of Public Road/Private Easement
SIT	E INFORMATION:
Plea	ase provide a detailed description of the following land features:
Top	ography (lay of the land), including estimated maximum slope, rock outcroppings, benches, etc:
appr the in	topography of the land is generally sloping north to south, with slopes ranging from oximately 0.5 to 25 percent. A steep slope borders the north and west ends of the property, while nterior of the site has a gentle slope of approximately 4 percent. The majority of the site is red with trees (outer perimeter) or grass and brush (interior and east side). Natural runoff flows h.
Wat	er courses (lakes, streams, rivers & other bodies of water):
No w	ater courses exist on the parcel.
	te within a flood plain? Yes No Firm Panel #: 0867E Map designation: X ngs & wells:
N/A	
Exist	ting structures (size & use):
	vel solid waste collection site currently sits on the property and includes an attendant hut, haz- building and approximately 13 eight cubic yard dumpsters.

Lar	nd cover (timber, pastures, etc):
	site is mostly graveled with some dense, mature trees on the east and west sides and a small ion is covered with grasses and brush.
Are	wetlands present on site?  Yes  Source of information: US Fish & Wildlife Service
Oth	er pertinent information (attach additional pages if needed):
SEF	RVICES:
Sew	rage disposal will be provided by:
	Existing Community System - List name of sewer district or provider and type of system:
	Proposed Community System – List type & proposed ownership:
×	<u>Individual system - List type</u> : Portable restroom will be placed at the collection site.
	lain the type of sewage system, capacity, maintenance plan, location of facilities, if applicable other details:
Wate	er will be supplied by:
X	Existing public or community system - List name of provider: Syringa Heights
	Proposed Community System - List type & proposed ownership:
	Individual well
	se explain the water source, capacity, system maintenance plan, storage and delivery system other details:

# Distance (in miles) to the nearest:

Public/Community Sewer System: N/A

Solid Waste Collection Facility: 8.5 miles

Public/Community Water System: 0 miles

Fire Station: 2.3 miles

Elementary School: 2.5 miles

Secondary Schools: 2.3 miles

County Road: Adjacent

County Road Name: Upland Drive

Which fire district will serve the project site? North Side Fire District

Which power company will serve the project site? Northern Lights Power

# How is the use/plan in accordance with the general and specific objectives of the Comprehensive Plan? (Copy of goals and objectives attached)

Property Rights:

The property rights of the applicant and adjacent property owners are protected by the Bonner County Revised Code requiring a Conditional Use Permit for the proposed solid waste collection site. This site was identified as suitable land having minimal impact on adjacent property owners.

# Population:

(Not required to complete this element)

School facilities & Transportation:

Schools and buses are not anticipated to be impacted by the collection site.

Economic Development:

This facility will maintain the Economic Development of the area by providing an attended, secured, fenced facility. The closest full service collection site is 11.3 miles away.

# Land Use:

A public solid waste facility is classified as a public land use and will be a valuable asset to the community.

Natural Resources:

This site is bordered by dense mature trees.

Hazardous Areas:

This site is not located in a flood hazard zone.

Public Services;

This collection site upgrade will offer a valuable public service to the area. The current site is dirty, unsightly, and in generally poor condition. A paved asphalt pad, landscape buffer and improved fencing will enhance the area.

Transportation:

Access to and from the site will be via Upland Drive.

#### Recreation:

The proposed use would not affect recreation or access to recreational lands.

Special Areas or Sites:
There are no known historical, archaeological, or ecological sites on the subject parcel.
Housing:
The proposed use will not limit use on the surrounding residential parcels.
Community Design: The attended collection site will reduce the travel required for members of the community to dispose of garbage and other household waste. Existing trees will form a screening buffer around the site to minimize the impact to adjacent properties.
Agriculture:
Will not be affected.
Implementation: ( Not required to complete this element)
I hereby certify that all the information, statements, attachments and exhibits submitted herewith are true to the best of my knowledge. I further grant permission to Bonner County employees and representatives, elected or appointed officials to enter upon the subject land to make examinations, post the property or review the premises relative to the processing of this application.
Landowner's signature: Bob Howard, Director Date: 8-11-17

Landowner's signature:\_\_\_\_\_\_ Date: \_\_\_\_

# Preliminary Grading/Stormwater Management and Erosion Control Bonner County – Upland Drive Solid Waste Facility

The purpose of this report is to assess the proposed Upland Solid Waste Collection Facility and Site Grading Plan to manage stormwater runoff from the increased impervious surface areas and control erosion from the project site. The plan is in accordance with Bonner County Revised Code §12-724.1. The

project site is approximately 10.68 ± (Parcel Numbers RP57N02W177075A and PR57N02W202400A) located in Bonner County, Idaho in Township 57 N, Range 02W, Sections 17 and 20 and lies west of Upland Drive.

This report is based on and limited to the soil types identified by the Soil Survey of Bonner County Area, USDA Web Soil Survey, the Kennedy Report, the preliminary site plan layout and general topography of the site.



Figure 1 - Existing solid waste entrance.

# **Existing Conditions**

The existing site is owned by Bonner County and contains an attendant shack, a household haz-mat storage building, approximately ten dumpsters and several recycling bins, covering approximately 5% of the overall site. The existing site entrance can be seen in Figure 1. A new solid waste and recycle collection site is proposed to replace the existing facility to meet the needs of residents in this region of

Bonner County. The area proposed for improvement is covered with grass and trees and the existing site (See Figure 2). The proposed on-site improvements include a new asphalt pad and the relocation of dumpsters, recycle bins, attendant station and household haz-mat storage building. The proposed use will be accessed from Upland Drive (See Figure 3).

A topographic survey and site visit has been performed. The natural slopes vary from approximately 0.5 percent on the east side near Upland Drive to approximately 25 percent on the west and south sides of the property where land

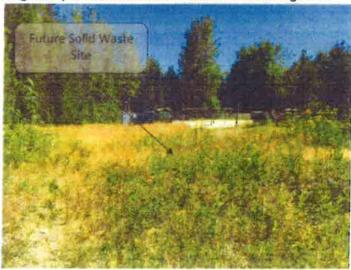


Figure 2 - Future solld waste site location.

Bonner County – Upland Solid Waste Collection Site Stormwater Management and Erosion Control

has been recontoured by apparent mining activity. The property is covered with grass and trees and the existing waste facility, and natural runoff from the site flows toward the south.

# Impervious Surfaces

The overall dimension of the asphalt pad proposed for this project is approximately 160 feet by 110 feet and the new road is approximately 28 feet wide and 225 feet long. The total impervious surfaces for this project are approximately 23,950 square feet and the total area disturbed from construction is approximately 0.87 acres.

# Soils

The Department of Agriculture's Soil Survey of the Bonner County Area and USDA Web Soil Survey identifies the soils on the subject property as "Pend Oreille silt loam" and "Dufort silt loam" (see Appendix).

According to the survey, the Pend Oreille silt loam is very deep and well drained. It formed in glacial till derived dominantly from granitic and metamorphic rock and has a mantle of volcanic ash and loess. Permeability of the Pend Oreille silt loam is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate. This soil map unit is used mainly for timber production, livestock grazing, wildlife habitat, and recreation. The most limiting soil layer permeability is 0.6 in/hr.



Figure 3 - Proposed solid waste facility approach.

According to the survey, the Dufort silt loam is very deep and well drained. It formed in glacial till derived dominantly from granitic and metamorphosed rock and has a mantle of volcanic ash and loess. Effective rooting depth is 60 inches or more and the permeability is moderate. Available water capacity is low to moderate. This soil map unit is used mainly for timber production, livestock grazing, wildlife habitat, and recreation. The most limiting soil layer permeability is 0.6 in/hr; calculations will be based on this most limiting layer.

# Stormwater Management

Stormwater run-off from the new impervious surfaces will be collected and treated in a grass infiltration swale. The swale volume is designed to capture, at a minimum, the first ½ inch of run-off from the newly

created impervious surfaces and to store any additional post-construction runoff for the 25-year storm event. If plans for future expansion are desired, the stormwater plan should be reevaluated at the time and reviewed with future Bonner County stormwater ordinances.

# Calculations

It is possible that Bonner County will choose to upgrade this rural drop box to a full-service site in the future, and stormwater calculations and system design were completed based on a full-service site buildout. In result, Swale A is much larger than what will be needed for this project.

Included in this report are the calculations that demonstrate the ability of the stormwater system capability to retain and treat the first ½" of run-off from the newly created impervious surfaces, the capacity of the detention basins and the design storm yield expected at the site. The Rational and Bowstring Methods were used to calculate stormwater volumes.

The assumptions and results of the calculations are in the table below:

#### **ASSUMPTIONS:**

INFILTRATION RATE OF 0.6 IN/HR
TIME OF CONCENTRATION = 5 MINUTES
PERVIOUS C VALUE = 0.38 (SEE APPENDIX FOR CALCULATIONS)

• WEIGHTED VALUE—MEADOW & GRAVEL
IMPERVIOUS C VALUE = 0.9
SWALE DEPTH = 8"

SWALE	TOTAL DRAINAGE AREA	IMPERVIOUS AREA	REQUIRED VOLUME FOR FIRST 1/2" RUNOFF	MIN. REQUIRED STORAGE FOR 25-YEAR STORM	SWALE VOLUME PROVIDED	SUFFICIENT FOR TREATMENT?	SUFFICIENT FOR STORAGE?
	FT <sup>2</sup>	FT <sup>2</sup>	FT <sup>3</sup>	FT <sup>3</sup>	FT <sup>3</sup>		
Α	25,865	17,472	728	433	2,333	YES	YES
В	8,393	6,468	270	290	333	YES	YES

NOTE: SEE BOWSTRING CALCULATION SHEETS IN APPENDIX FOR BREAKDOWN OF NUMBERS.

# **Temporary Erosion Control**

Once cuts and fills are complete, fiber wattles should be installed on the slopes to reduce the risk of erosion and sediment transport.

The site will be accessed by a new approach on Upland Drive. If mud is tracked from the site, greater than ordinary, temporary construction entrance stabilization should be placed as needed on the access utilized during construction.

# **Permanent Erosion Control**

All disturbed areas associated with the project shall drain to the rock-lined ditch and swale area. All disturbed areas associated with the project that do not receive pavement or concrete shall be reseeded promptly. This re-vegetation will serve as permanent erosion and sediment control from the site. Alternate seed mixture recommendations may be obtained from the U.S.D.A Natural Resource Conservation Service or a commercially marketed grass mixture. All re-vegetation work should be accomplished between the dates of April 15 and October 15 of a given year.

Riprap lined channels will be constructed to convey stormwater from the upper solid waste site pad area down to the natural low point of the site. Riprap lined channels should be able to flow approximately 2.52 cfs at the dimensions shown in the appendix and a 1% slope.

# Construction Schedule

The proposed schedule for site activities shall occur in the following order in Fall 2017 or Spring 2018:

Time Sequence	Construction Task
1	Existing vegetation shall be preserved around the site in order to provide a buffer zone to help control erosion.
2	Rough-in swales to serve as sedimentation ponds during construction
3	Mass grading of access road and solid waste facility pad
4	Construct stabilized construction entrance (if needed)
5	Install culverts
6	Construct riprap lined channels to Swale
7	Install fiber rolls on all cut and fill slopes
8	Perform construction erosion control, staging, and site construction
9	Pave access and site pad
10	Re-grade swales per plan
11	Hydroseed and re-vegetate all remaining disturbed areas not covered with gravel and asphalt
12	Remove silt fence after all site vegetation is established and stable

# Operation and Maintenance Plan

The contractor is responsible for installation and maintenance of erosion and sediment control until the site has been turned over to the Bonner County Solid Waste Department. Once the project is turned over, operation and maintenance shall be the responsibility of the Bonner County Solid Waste Department (208-255-5681).

Operation and maintenance shall include and not be limited to the following items:

- 1. Install temporary erosion control measures as needed.
- The newly seeded areas shall be inspected weekly until it is certain that adequate root depth has formed and shall be inspected every three months and after every large storm event for erosion. If erosion has occurred, the eroded soils and vegetation shall be replaced

3. The grassy swales shall be inspected every three months and after every large storm event. Any sediments and other debris deposited in the ditch or swale shall be removed and disposed off-site. In the summer months, the ditches and swale shall be maintained as needed.

# Summary

The existing site is adequately suited for the proposed improvements. The site is capable of withstanding disturbances created by the proposed project and Stormwater Management and Erosion Control plan without risk of additional site run-off and/or sedimentation of ground water and/or surface water. The Stormwater Management plan is adequate to treat the first ½" of rainfall from new impervious surfaces and retain any additional volume proposed for the site (based on the 25-year storm).



# Land Capability Report

Bonner County - Upland Drive Solid Waste and Recycle Collection Facility



# **July 2017**

The purpose of this report is to identify the capability of the land at the future Upland Drive Solid Waste and Recycle Collection Facility to withstand disturbance without risk of substantial harmful consequences of floods, sewage, drainage, erosion, sedimentation, or geological or surface slippage due to planned improvements on the site. The following information is provided as part of the Conditional Use Permit Application for the Upland Drive Solid Waste and Recycle Collection Facility site improvements for satisfaction of Bonner County Code Section 12-222(I).

The report is based on and limited to the soil types identified by site inspection, Soil Survey of the Bonner County Area, National Cooperative Soil Survey (NCSS) and site plan layout and general topography of the site.

# Introduction

The County owns parcels RP57N02W177075A and PR57N02W202400A which total approximately 10.68 acres with Suburban Zoning (referred to as property). The property address is 274 Upland Drive and currently has a collection facility located on the site. The existing gravel site has one paved access to Upland Drive and generally slopes from north to south at varying grades. The majority of the property is covered with trees and natural vegetation with the exception of the current facility.

The proposed Solid Waste and Recycle Facility is needed to provide full-service collection to local residents, provide for future growth, and improve the functionality of the transfer station with concrete pads and retaining walls. Currently, the closest full-service collection facility is the Colburn site located 11.3 miles away. This collection site will provide a location for residents to dispose of garbage other than household waste and will reduce the amount of illegal dumping that occurs due to the considerable distance of the nearest full-service site.

The information provided in this report highlights the land capability for this project in relation to the existing site conditions and surrounding properties.

# Impervious Surfaces

The new solid waste and recycle collection site will require the addition of a new asphalt pad and the relocation of dumpsters, recycle bins, attendant station and household haz-mat storage building. The overall dimensions of the asphalt pad proposed for this project is approximately 160 feet by 110 feet.

# Soils

The Department of Agriculture's Soil Survey of the Bonner County Area and USDA Web Soil Survey identifies the soils on the subject property as "Pend Oreille silt loam" and "Dufort silt loam." According to the survey,

both soils are very deep and well drained. Both formed in glacial till derived dominantly from granitic and metamorphic rock and have a mantle of volcanic ash and loess.

Permeability of the Pend Oreille and Dufort silt loam is moderate. Effective rooting depth is 60 inches or more for both soils. Available water capacity of Pend Oreille silt loam is moderate, and water capacity is low to moderate for Dufort silt loam. Both soil map units are used mainly for timber production, livestock grazing, wildlife habitat, and recreation. The most limiting soil layer permeability is 0.6 in/hr for both soils; calculations will be based on this most limiting layer.

# **Flooding Potential**

According to the FEMA Flood Map 16017C0950E, the property is not in the 100-year flood plain. Natural grades onsite slope at approximately 0.5 to 25 percent, with proposed improvements planned in the higher elevations of the site.

# Sanitary Sewer and Domestic Water

The Solid Waste Collection site will have a permanent vault privy for public use. The site is currently served with domestic water.

# Drainage, Erosion, and Sedimentation

Site drainage, erosion, and sedimentation have been incorporated into the Stormwater and Erosion Control Plan for this site. Runoff stormwater will be collected and treated in the proposed grass infiltration swale. The swale system will be designed to capture, at a minimum, the first ½ inch of runoff from the new site or provide detention for a 25-year design storm, whichever is greater.

Much of the existing site is covered with trees and natural vegetation. During preparation and construction of the site, erosion control measures should be used to prevent erosion from occurring. Prior to work taking place, all areas to be disturbed shall be bordered with a temporary silt fence (or other best management practice) on the lower portion of the site.

# Wetlands

The US Fish and Wildlife Wetland Map does not show wetlands mapped within the property boundaries.

# Geological Surface Slippage

The site investigation did not reveal signs of slope instability or mass movement onsite or in the vicinity.

# Summary

It appears the existing site is suited for the proposed improvements. The site is capable of withstanding disturbances without risk of substantial harmful consequences of floods, sewage, drainage, erosion, sedimentation, or geological or surface slippages, as required by Bonner County Code 12-222(J).

#### **SWALE A CALCULATIONS**

# SOLID WASTE FACILITY STORMWATER CALCULATIONS

#### I. 25-YEAR STORM CALCULATIONS

A. Time increment for Bowstring Method calculations (min). 5 minutes B. Calculated Time of Concentration (min) 5.0 min. Time of Concentration Used (min) 5.0 min. L = 110 n avg = 0.151 s = 0.052Ct = 0.4C. Outflow (cfs) 0.05 cfs OUTFLOW STORAGE TYPE "1" DRYWELLS 0 @ 0.30 cfs = 0.00 cfs 0 cf TYPE "2" DRYWELLS 0@ 1.00 cfs = 0.00 cfs 0 cf Swale Infiltration 3500 sf @ 0.6 in/hr 0.05 cfs 2333 cf assume 0.6 ln/hr TOTAL = 0.05 cfs 2333 cf infiltration D. Total Area (acres) 0.59 acres E. Intensity (inches/hour) 2.88 in/hr F. Impervious Area (sf) 17472 sf G. Developed "C" Factor 0.73 **Runoff Coefficients** AREA x "C" = 0.43 Impervious Other 0.9 0.38 H. Q Peak = C\*I\*A (cfs) 1.25 cfs

I. Routing Calculations "Bowstring Method"

TIME INC.	TIME INC.	INTENSITY	Q LEVEL	VIN	V OUT	POST DEVL. VOL.	PRE DEVL. VOL.	REQUIRE
(MIN)	(SEC)	(IN/HR)	(CFS.)	(CU. FT.)	(CU. FT.)	(CU. FT.)	(CU. FT.)	(CU. FT.)
5	300	2.88 in/hr	1,25	502.87	14.58	488.29	261.32	226.97
10	600	2.05 in/hr	0.89	627.30	29.17	598.13	325.98	272,16
15	900	1.69 in/hr	0.73	735.44	43.75	691.59	382.17	309.52
20	1200	1.54 in/hr	0.67	872.41	58.33	814.08	453.35	360.73
25	1500	1.34 in/hr	0.58	933.46	72.92	860.55	485.07	375.47
30	1800	1.20 in/hr	0.52	988.71	87.50	901.21	513.78	387.43
35	2100	1.09 in/hr	0.47	1039.35	102.08	937.27	540.10	397.17
40	2400	1.00 in/hr	0.43	1086.23	116.67	969.57	564.46	405,11
45	2700	0.93 in/hr	0.40	1130.00	131.25	998.75	587.20	411.55
50	3000	0.87 In/hr	0.38	1171.12	145.83	1025.29	608.57	416.72
<b>5</b> 5	3300	0.82 in/hr	0.36	1209.98	160.42	1049.56	628.76	420.80
60	3600	0.78 in/hr	0.34	1246.87	175.00	1071.87	647.93	423.94
90	5400	0.61 in/hr	0.26	1448.40	262,50	1185.90	752.66	433.24
120	7200	0.51 in/hr	0.22	1618.02	350.00	1268.02	840.80	427.22
380	22800	0.25 in/hr	0.11	2515.61	1108.33	1407.28	1307.23	100.05
720	43200	0.16 in/hr	0.07	3100.50	2100.00	1000.50	1611.17	-610.67
960	57600	0.14 in/hr	0.06	3407.65	2800.00	607.65	1770.78	-1163.13
1200	72000	0.12 ln/hr	0.05	3667.08	3500.00	167.08	1905.59	-1738.51
1440	86400	0.10 in/hr	0.05	3893.86	4200.00	-306.14	2023,44	-2329.58

#### 

Sufficient Sufficient
Treatment Storage?
YES YES

#### **SWALE B CALCULATIONS**

# SOLID WASTE FACILITY STORMWATER CALCULATIONS

# I. 25-YEAR STORM CALCULATIONS

II.

A. Time Increment for	5 minutes					
Calculated Time of Time of Concentrat	AND A STATE OF THE	in)	5.0 min.		5.0 min.	
	L = 196 s = 0.052	n avg = Ct =				
C. Outflow (cfs)	3 - 0.032	- 12	0.14		0.01 cfs	
			OUTFLOW	STORAGE		
TYPE "1" DRYWELLS	0 @	0.30 cfs =	0.00 cfs	0 cf		
TYPE "2" DRYWELLS	0 @	1,00 cfs =	0.00 cfs	0 cf		
Swale Infiltration	500 sf @	0.6 in/hr	0.01 cfs	333 cf	assume 0.6 in/hr	
		TOTAL =	0.01 cfs	333 cf	Infiltration	
D. Total Area (acres)					0.19 acres	0.2 acres
E. Intensity (Inches/ho	our)				2.88 in/hr	
F. Impervious Area (sf	),				6468 sf	
G. Developed "C" Fact	or				0.78	
			Runoff C	oefficients		
AREA x "C	." = 0.15		Impervious	Other		
			0.9	0.38		
H. Q Peak = C*I*A (cfs	V.				0.43 cfs	

I. Routing Calculations "Bowstring Method"

YES

YES

TIME INC.	TIME INC.	INTENSITY (IN/HR)	Q LEVEL (CFS.)	V IN (CU. FT.)	V OUT (CU. FT.)	POST DEVL. VOL. (CU. FT.)	PRE DEVL. VOL. (CU. FT.)	REQUIRED STORAGE (CU. FT.)
5	300	2.88 ln/hr	0.43	174.22	2.08	172.13	84.79	87.34
10	600	2.06 in/hr	0.31	217,33	4.17	213.16	105.78	107.36
15	900	1.69 in/hr	0.25	254.79	6.25	248.54	124.01	124.53
20	1200	1.54 in/hr	0.23	302.24	8.33	293.91	147.11	146.80
25	1500	1.34 in/hr	0.20	323.39	10.42	312.98	157,40	155.57
30	1800	1.20 ln/hr	0.18	342.53	12.50	330.03	166.72	163.32
35	2100	1.09 ln/hr	0.16	360.08	14.58	345.49	175,26	170.24
40	2400	1.00 in/hr	0.15	376.32	16.67	359.65	183.16	176.49
45	2700	0.93 ln/hr	0.14	391.48	18.75	372.73	190.54	182.19
50	3000	0.87 ln/hr	0.13	405,73	20.83	384.90	197.48	187.42
55	3300	0.82 ln/hr	0.12	419.19	22.92	396.27	204.03	192.25
60	3600	0.78 ln/hr	0.12	431.97	25.00	405.97	210.25	196.72
90	5400	0.61 ln/hr	0.09	501.79	37.50	464.29	244.23	220.06
120	7200	0.51 in/hr	0.08	560.56	50.00	510.56	272.83	237.72
380	22800	0.25 in/hr	0.04	871.52	158.33	713.19	424.19	289.00
720	43200	0.16 ln/hr	0.02	1074.15	300.00	774.15	522.81	251.34
960	57600	0.14 in/hr	0.02	1180.56	400.00	780.56	574.61	205.96
1200	72000	0.12 in/hr	0.02	1270.44	500.00	770.44	618.35	152.09
1440	86400	0.10 ln/hr	0.02	1349.01	600.00	749.01	656.59	92.42

			max→	290 cf
PONDING CA	CULATIONS			+
				4
A.	Rqd. 0.5" Treatment Volume	270 cu.ft.		4
В.	Provided Swale Ponded Volume	333 cuift.		4
C.	Total Storage Available	333 cu.ft. > max.Required Storage≈	290 cf	<b>← ←</b>
S	ufficient Sufficient			
Tr	eatment Storage?			

# TABLE 6-2 RUNOFF COEFFICIENTS FOR THE RATIONAL METHOD FOR DETERMINING PEAK DISCHARGE

Type of Cover	Flat	Rolling 2%-10%	Hilly Over 10%	
Pavement and Roofs	0.90	0.90	0.90	
Earth Shoulders	0.50	0.50	0.50	
Drives and Walks	0.75	0.80	0.85	
Gravel Pavement	0.50	0.55	0.60	Weighted Existing C Value
City Business Areas	0.30	0.85	0.85	Troighted Existing o vales
Suburban Residential	0.25	0.35	0.40	
Single Family Residential	0.30	0.40	0.50	Area of meadow/pasture = 44,670 ft <sup>2</sup>
Multi Units, Detached	0.40	0.50	0.60	Area of gravel = 20,070 ft
Multi Units, Attached	0.60	0.65	0.70	Total area = 64,740 ft <sup>2</sup>
Lawns, Very Sandy Soil	0.05	0.07	0.10	
Lawns, Sandy Soil	0.10	0.15	0.20	$C = (44.670 \pm 0.3) \pm (20.070 \pm 0.55)$
Lawns, Heavy Soil	0.17	0.22	0.35	64,740
Grass Shoulders	0.25	0.25	0.25	C = 0.38
Side Slopes, Earth	0.60	0.60	0.60	
Side Slopes, Turf	0.30	0.30	0.30	
Median Areas, Turf	0.25	0.30	0.30	
Cultivated Land, Clay and Loam	0.50	0.55	0.60	
Cultivated Land, Sand and Gravel	0.25	0.30	0.35	
Industrial Areas, Light	0.50	0.70	0.30	
Industrial Areas, Heavy	0.60	0.80	0.90	
Parks and Cemetaries	0.10	0.15	0.25	
Playgrounds	0.20	0.25	0.30	
Woodland and Forests	0.10	0.15	0.20	
Meadows and Pasture Land	0.25	0.30	0.35	
Pasture with Frozen Ground	0.40	0.45	0.50	
Unimproved Areas	0.10	6.20	0.30	

# TABLE 6-3 GROUND COVER COEFFICENTS

Ту	pe of Cov	rer		K (g	round cove	r coefficie	nt)
Forest with hea Minimum tillag Short pasture g Nearly bare gro Grassed waterw Paved area Gutter flow	e cultivat rass or la ound	ion	ditch		00		
			4	Conc	CATTON TO		CMP (n = 0.024)
Storm Sewers (C	Concrete)	12 Inch dia 18 Inch dia 24 Inch dia	meter	3,0 3,9 4,7	00		1,500 1,950 2,350
Open Channel F	low (n = 0.	.040)	l foot deep 2 feet deep 4 feet deep		Narrow W/D = 1 1,100 1,800 2,800	Medium W/D = 2 1,500 2,300 3,700	Wide W/D = 9 2,000 3,100 5,000

	Riprap	Channe	el .
Project Description	A Division of the second		
Friction Method	Manning Formula		
Solve For	Discharge		
Input Data	ars, preside	1	
Roughness Coefficient		0.069	
Channel Slope		0.01000	ft/ft
Normal Depth		1.00	ft
Left Side Slope		2.00	ft/ft (H:V)
Right Side Slope		2.00	ft/ft (H:V)
Results	ARCHITICAL D		
Diacharge		2.52	ft*/s
Flow Area		2.00	n.
Wetted Perimeter		4.47	π
Hydraulic Radius		0.45	π
Top Width		4.00	ft.
Critical Depth		0.63	ft
Critical Slope		0.11836	ft/ft
Velocity		1.26	ft/s
Velocity Head		0.02	ft
Specific Energy		1.02	ft
Froude Number		0.31	
Flow Type	Subcritical		
GVF Input Data			
Downstream Depth		0.00	R
ength	€	0.00	ft
lumber Of Steps		0	
GVF Output Data			
Jpstream Depth		0.00	R
Profile Description			
Profile Headloss		0.00	ft
Downstream Velocity		Infinity.	ft/a
Jpstream Velocity		infinity	ft/s
Normal Depth		1.00	π
		0.63	ft
Critical Depth		4.44	,-
Critical Depth Channel Slope		0.01000	ft/ft



# MAP LEGEND

Spoil Area	Stony Spot	Very Stony Spot	Wet Spot	Other	Special Line Feat	tures
æ	0	8	Ð	٥	•	Water Features
Area of Interest (AOI)	Area of Interest (AOI)	socowod fint new too.	The state of the s	Soil May Unit Lines	Special Point Features	Blowout
Area of In		Soils	1	}	Special	(0)

ial Line Features ğ

Transportation ŧ

Closed Depression

Background

Streams and Canals

**Borrow Pit** 

Clay Spot

Local Roads

**Gravelly Spot** 

Gravel Prt

X

Aenal Photography

Marsh or swamp

Lava Flow

Landfill

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Sport Sandy Spot

Interstate Highways Major Roads US Routes Rails

The soil surveys that comprise your AOI were mapped at 1:24,000. Warning: Soil Map may not be valid at this scale.

MAP INFORMATION

misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting Enlargement of maps beyond the scale of mapping can cause soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov Natural Resources Conservation Service Coordinate System: Web Mercator (EPSG:3857) Source of Map:

Albers equal-area conic projection, should be used if more accurate Maps from the Web Soil Survey are based on the Web Mercator distance and area. A projection that preserves area, such as the projection, which preserves direction and shape but distorts calculations of distance or area are required. This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Bonner County Area, Idaho, Parts of Bonner Survey Area Data: Version 10, Sep 9, 2015 and Boundary Counties Soil Survey Area:

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger. Date(s) aerial images were photographed: Jul 11, 2011—Jul 24,

imagery displayed on these maps. As a result, some minor shifting The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background of map unit boundaries may be evident.

Severely Eroded Spot

Slide or Slip Sodic Spot

Sinkhole

# Map Unit Legend

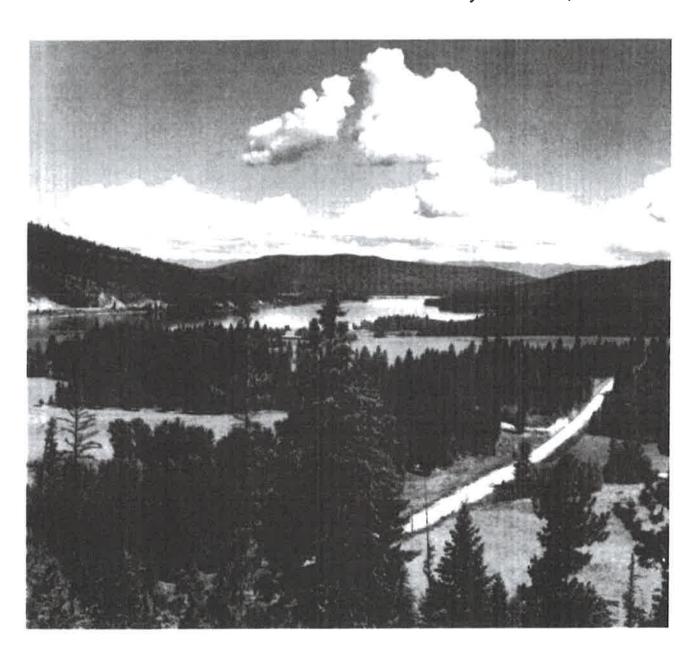
Bonner County Area, Ideho, Parts of Bonner and Boundary Counties (ID604)						
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI			
10	Dufort silt loam, 5 to 45 percent slopes	2.3	27.7%			
15	Hoodoo silt loam, 0 to 1 percent slopes	0.0	0.4%			
35	Pend Oreille silt loam, 5 to 45 percent slopes	6.1	71.9%			
Totals for Area of Interest		8.4	100.0%			



Soil Conservation Service In Cooperation with the University of Idaho, College of Agriculture, and the Idaho Soil Conservation Commission

# Soil Survey of the Bonner County Area, Idaho

Parts of Bonner and Boundary Counties, Idaho



# index to map units

. 2 2			
1—Ardtoo gravelly sandy loam, 35 to 65 percent	40	33-Mission silt loam, 12 to 30 percent slopes	4
slopes	. 16	34—Odenson silt loam, 0 to 2 percent slopes	42
2—Bonner gravelly silt loam, 0 to 4 percent slopes	. 16	35-Pend Oreille silt loam, 5 to 45 percent slopes	43
3—Bonner gravelly silt loam, 30 to 65 percent		36-Pend Oreille-Hoodoo silt loams, 0 to 30 percent	
slopes	. 18	slopes	4
4-Bonner silt loam, cool, 0 to 4 percent slopes	18	27 Pend Oroille Book outeren complet. 5 to 45	44
5—Brickel-Bubble lend accordation 5 to 45 correct	10	37-Pend Oreille-Rock outcrop complex, 5 to 45	1 414
5—Brickel-Rubble land association, 5 to 45 percent	4.0	percent slopes	45
slopes	19	38—Priestiake gravelly sandy loam, 15 to 35	
6—Cabinet silt loam, 2 to 12 percent slopes		percent slopes	46
7—Cabinet silt loam, 12 to 30 percent slopes	20	39-Priestlake gravelly sandy loam, 35 to 65	
8—Capehorn silt loam, 0 to 2 percent slopes	21	percent slopes	47
9-Colburn very fine sandy loam, 0 to 4 percent		40-Prouty gravelly loam, 35 to 65 percent slopes	
slopes	22	41 Powell muck 0 to 1 agreent stones	48
10-Dufort silt loam, 5 to 45 percent slopes	23	41—Pywell muck, 0 to 1 percent slopes	48
10—Dufort Book autorea apparent slopes	23	42—Pywell-Hoodoo complex, 0 to 1 percent slopes	49
11—Dufort-Rock outcrop complex, 5 to 45 percent		43—Rathdrum silt loam, 0 to 2 percent slopes	49
slopes	24	44-Rathdrum silt loam, cool, 0 to 8 percent slopes.	51
12—Elmira loamy sand, 0 to 8 percent slopes	25	45-Rathdrum-Bonner silt loams, 0 to 8 percent	•
13—Elmira Variant loamy coarse sand, 0 to 2		slopes	50
percent slopes	25	46—Rock outcrop-Rubble land complex	52
14-Haploxeralfs and Xerochrepts, 30 to 55 percent		47 Sagle cit loam 5 to 20 persont classes	53
slongs	26	47—Sagle silt loam, 5 to 30 percent slopes	53
slopes		48—Selle fine sandy loam, 0 to 8 percent slopes	54
15—Hoodoo silt loam, 0 to 1 percent slopes	27	49—Selle-Elmira complex, 0 to 20 percent slopes	54
16—Hun gravelly silt loam, 35 to 65 percent slopes	28	50—Selle-Mission complex, 0 to 12 percent slopes	55
17—Jeru very stony loam, 35 to 65 percent slopes	29	51—Treble gravelly sandy loam, 5 to 20 percent	-
18—Jeru very stony sandy loam, warm, 5 to 35		slopes	57
percent slopes	29	52-Treble gravelly sandy loam, 20 to 55 percent	JI
19-Jeru very stony sandy loam, warm, 35 to 75		clonee	
percent slopes	30	slopes	57
20-Kaniksu sandy loam, 0 to 4 percent slopes	31	53—Treble gravelly sandy loam, high precipitation,	
21 Klooteh gravelly goody loam 15 to 25 appears	31	15 to 35 percent slopes	58
21—Klootch gravelly sandy loam, 15 to 35 percent		54—I reble gravelly sandy loam, high precipitation.	
slopes	31	35 to 65 percent slopes	59
22—Klootch gravelly sandy loam, 35 to 65 percent		55—Treble-Rock outcrop association, 20 to 65	
slopes	32		59
23-Kootenai gravelly silt loam, 0 to 4 percent		56—Treble, high precipitation-Rock outcrop	33
slopes	33	compley 15 to 35 percent classes	20
24 Kootenai gravelly silt loam, 20 to 55 percent	33	complex, 15 to 35 percent slopes	60
closes gravery sit toalli, 20 to 35 percent		57—Treble, high precipitation-Rock outcrop	
slopes	34	complex, 35 to 65 percent slopes	61
25-Kootenai-Bonner gravelly silt loams, 0 to 20		58-Vassar silt loam, 30 to 65 percent slopes	62
percent slopes	34	59-Vassar-Moscow association, 35 to 65 percent	
26-Kruse silt loam, 30 to 65 percent slopes	35		63
27-Kruse Variant silt loam, 5 to 20 percent slopes	36	60-Vay gravelly silt loam, 35 to 65 percent slopes	64
28-Lenz-Rock outcrop association, 30 to 65			
percent slopes	37	62 Vay Ardina appointing 00 to 05 percent slopes	64
29-Melder loam, 15 to 35 percent slopes	37	62—Vay-Ardtoo association, 20 to 35 percent	
20_Malder loam 25 to 65 percent alones		slopes	65
30-Melder loam, 35 to 65 percent slopes	38	03—vay-Ardtoo association, 35 to 65 percent	
31—Mission silt loam, 0 to 2 percent slopes	39	SIODES	66
32—Mission silt loam, 2 to 12 percent slopes	40	64-Wrencoe silty clay, 0 to 2 percent slopes	68

grand fir and western white pine at 100 years of age is 163 cubic feet per acre.

The main limitations for the harvesting of timber are seasonal wetness and susceptibility of the soil to compaction. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,800 pounds of air-dry vegetation per acre to less than 100 pounds per acre as the canopy closes. Grazing should be delayed until the soil has drained sufficiently and is firm enough to withstand trampling by livestock.

Recreation.—This unit is suited to recreational development. It is limited mainly by wetness in spring and rare periods of flooding.

Homesite development.—This unit is poorly suited to homesite development. The main limitations are the hazard of flooding, wetness, a hazard of seepage from septic tank absorption fields, and a hazard of frost heaving. Buildings and roads should be designed to offset the affects of flooding, the high water table, and frost heaving. Specially designed waste disposal systems are needed.

This map unit is in capability subclass Illw and in woodland suitability subclass 1w.

10—Dufort silt loam, 5 to 45 percent slopes. This very deep, well drained, rolling to steep soil is on foothills and mountainsides. It formed in glacial till derived dominantly from granitic and metamorphosed rock and has a mantle of volcanic ash and loess. Elevation is 2,100 to 3,600 feet. The average annual precipitation is about 32 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 100 days.

Typically, the surface layer is brown, slightly acid silt loam about 2 inches thick. The upper 11 inches of the subsoil is yellowish brown, neutral silt loam, and the lower 11 inches is yellowish brown, medium acid gravelly silt loam. The substratum to a depth of 60 inches or more is light gray, neutral very gravelly sandy loam.

Permeability of this Dufort soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is low to moderate. Runoff is rapid to very rapid, and the hazard of water erosion is high to very high.

Included in this unit are small areas of Pend Oreille silt loam on north-facing side slopes and in ravines, Treble gravelly sandy loam on south-facing side slopes, Bonner gravelly silt loam in benchlike areas, and Sagle silt loam in concave, bowllike areas on foot slopes. Also included are small areas of Kootenai gravelly silt loam on side slopes and ridges and a soil that is similar to this Dufort soil but has slopes of 45 to 65 percent.

This unit is used mainly for timber production, livestock grazing, wildlife habitat, and recreation. It is also used for homesite development and for hay and pasture.

Cropland.—This unit is poorly suited to cultivated crops. It is limited mainly by cool soil temperatures, a short growing season, slope, and the hazard of water erosion.

Hay and pasture.—This unit is suited to hay and pasture. The main limitations are slope and the hazard of water erosion. Grazing when the soil is moist results in compaction of the surface layer, poor tilth, and excessive runoff. Among the adapted improved forage plants are orchardgrass, timothy, tall fescue, and white clover.

Woodland.—Grand fir, Douglas-fir, ponderosa pine, and lodgepole pine are the main woodland species on this unit. Among the trees of limited extent are western larch and western white pine. On the basis of a 50-year site curve, the average site index for grand fir is 75. On the basis of a 100-year site curve, the average site index for Douglas-fir is 115. Yield tables indicate that the maximum average annual growth is 144 cubic feet per acre of grand fir at 103 years of age and 132 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations for the harvesting of timber are slope, the hazard of water erosion, and susceptibility of the soil to compaction. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding disturbs the soil less. Steep yarding paths, skild trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 5 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,800 pounds of air-dry vegetation per acre to less than 100 pounds per acre as the canopy closes.

Recreation.—Most areas of this unit are poorly suited to recreational development because of slope. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as recreational sites. If the unit is used for recreational development, the main limitations are dustiness, slope, and the hazard of water erosion. Cuts and fills should be seeded or mulched. Areas used for recreation can be protected from soil blowing and dust by maintaining plant cover.

Homesite development.—Most areas of this unit are poorly suited to homesite development because of stopa, included in this unit, however, are areas of more nearly level soils that are more suitable for use as homesites. Onsite investigation is required to identify these areas.

This map unit is in capability subclass VIe and in woodland suitability subclass 1r.

11—Dufort-Rock outcrop complex, 5 to 45 percent slopes. This map unit is in rolling to steep areas on foothills and mountainsides. Elevation is 2,100 to 3,800 feet.

This unit is about 40 percent Dufort silt loam and 30 percent Rock outcrop. The remaining 30 percent is included soils. The Dufort soil is on plane or concave side slopes, and Rock outcrop is on or near ridges and knobs. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Treble gravelly sandy loam on south-facing side slopes; Ardtoo gravelly loam on south-facing mountainsides near ridges; Pend Orellle silt loam on cool, north-facing side slopes and in ravines; and Lenz stony sandy loam near areas of Rock outcrop on steep shoulders and ridges. Also included are small areas of Bonner gravelly silt loam in benchlike areas and Sagle silt loam in concave, bowlike areas on foot slopes.

The Dufort soil is very deep and well drained. It formed in glacial till derived dominantly from granitic and metamorphic rock and has a mantle of volcanic ash and loess. The average annual precipitation is about 32 inches, the average annual air temperature is about 44 degrees F, and the average frost-free period is about 100 days.

Typically, the surface layer is brown, slightly acid silt loam about 2 inches thick. The upper 11 inches of the subsoil is yellowish brown, neutral silt loam, and the lower 11 inches is yellowish brown, medium acid gravelly silt loam. The substratum to a depth of 80 inches or more is light gray, neutral very gravelly sandy loam.

Permeability of this Dufort soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is low to moderate. Runoff is rapid to very rapid, and the hazard of water erosion is high to very high.

Rock outcrop consists of areas of exposed granite, gnelss, or schist that is hard and is fractured in places. Some soil material is in the cracks and crevices.

This unit is used mainly for timber production, livestock grazing, wildlife habitat, and recreation. It is also used for homesite development.

Woodland.—Grand fir, Douglas-fir, ponderosa pine, and lodgepole pine are the main woodland species on the Dufort soil. Among the trees of limited extent are western larch and western white pine. On the basis of a 50-year site curve, the average site index for grand fir is 75. On the basis of a 100-year site curve, the average site index for Douglas-fir is 115. Yield tables indicate that the maximum average annual growth is 144 cubic feet per acre of grand fir at 103 years of age, and 132 cubic feet per acre of Douglas-fir at 40 years of age. The areas of Rock outcrop in this unit will reduce the yield of the unit about 30 percent.

The main limitations for the harvesting of timber are slope, the hazard of water erosion, susceptibility of the soil to compaction, and the areas of Rock outcrop. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding disturbs the soil less. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction. The areas of Rock outcrop may cause breakage of timber and hinder yarding.

Plant competition and the areas of Rock outcrop are the main concerns in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration. The areas of Rock outcrop limit the even distribution of naturally regenerated tree seedlings.

Livestock grazing. —This unit can produce forage for livestock and big game animals for 5 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 1,300 pounds of air-dry vegetation per acre to less than 100 pounds per acre as the canopy closes. The production of forage is limited by the areas of Rock outcrop, which generally interfere with the movement of livestock and limit the accessibility of torage.

Recreation.—Most areas of this unit are poorly suited to recreational development because of slope. Included in the unit, however, are areas of more nearly level soils that are more suitable for use as recreational sites. If this unit is used for recreational development, the main limitations are slope, dustiness, the hazard of water erosion, and the areas of Rock outcrop. Cuts and fills



Figure 7.—Hay grown on Odenson silt loam, 0 to 2 percent slopes.

forage plants are timothy, meadow foxtail, reed canarygrass, tall feacue, and alsike clover.

Recreation.—This unit is poorly suited to recreational development. The main limitation is wetness in winter and spring. Drainage should be provided for paths and trails.

Homesite development.—This unit is poorly suited to homesite development; however, population growth has resulted in increased construction of homes on it. The main limitations are wetness, slow permeability, and a hazard of frost heaving, and low soil strength. Septic tank absorption fields do not function properly on this wet soil late in winter and in spring; therefore, specially designed waste disposal systems are needed. Roads and buildings should be designed to offset the effects of the seasonal high water table, frost heaving, and low soil strength.

This map unit is in capability subclass IVw.

35—Pend Orelie slit loam, 5 to 45 percent slopes. This very deep, well drained, rolling to steep soil is on foothills and mountainsides. It formed in glacial till derived dominantly from granitic and metamorphic rock and has a mantle of volcanic ash and loess. Elevation is 2,100 to 3,600 feet. The average annual precipitation is about 32 inches, the average annual air temperature is

about 43 degrees F, and the average frost-free period is about 90 days.

Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is light yellowish brown, neutral slit loam about 4 inches thick. The subsoil is light yellowish brown, slightly acid silt loam and loam about 13 inches thick. The next layer is pale brown, medium acid and slightly acid gravelly sandy loam about 24 inches thick. The substratum to a depth of 60 inches or more is very pale brown, slightly acid very cobbly sandy loam.

Permeability of this Pend Oreille soil is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Runoff is medium to very rapid, and the hazard of water erosion is high to very high.

Included in this unit are small areas of Dufort silt loam and Treble gravelly sandy loam on rolling to steep, broken, south-facing side slopes; Yay gravelly silt loam on north-facing mountainsides; Bonner gravelly silt loam on level benches; Sagle silt loam in concave, bowllike areas; and Hoodoo silt loam in wet depressional areas.

This unit is used mainly for timber production, livestock grazing, wildlife habitat, and recreation. It is also used for homesite development and for hay and pasture.

Cropland.—This unit is poorly suited to cultivated crops. It is limited mainly by cool soil temperatures, a

short growing season, the hazard of water erosion, and slope.

Hay and pasture.—This unit is suited to hay and pasture. The main limitations are slope in the steeper areas and the hazard of water erosion. Grazing when the soil is moist results in compaction of the surface layer, poor tilth, and excessive runoff. Among the adapted improved forage plants are intermediate wheatgrass, smooth brome, tall fescue, and orchardgrass.

Woodland.—Western redcedar, western white pine, grand fir, and Douglas-fir are the main woodland species on this unit. Among the trees of limited extent are western larch, ponderosa pine, and lodgepole pine. On the basis of a 50-year site curve, the average site index is 75 for grand fir and 70 for western white pine. On the basis of a 100-year site curve, the average site index for Douglas-fir is 115. Yield tables indicate that the maximum sverage annual growth is 144 cubic feet per acre of grand fir at 103 years of age, 135 cubic feet per acre of western white pine at 105 years of age, and 132 cubic feet per acre of Douglas-fir at 40 years of age.

The main limitations for the harvesting of timber are slope in the steeper areas, the hazard of water erosion, and susceptibility of the soil to compection. Wheeled and tracked equipment can be used in the more gently sloping areas, but cable yarding disturbs the soil less. Steep yarding paths, skid trails, logging roads, and firebreaks are subject to rilling and gullying unless adequate water bars are provided and plant cover is reestablished. Use of wheeled and tracked equipment when the soil is moist causes ruts, compacts the soil, and damages the roots of trees. Compaction can be reduced by using suitable methods of harvesting timber, laying out skid trails in advance, and harvesting timber when the soil is drier and less susceptible to compaction.

Plant competition is the main concern in the production of timber. When openings are made in the canopy, invading brushy plants delay natural tree regeneration.

Livestock grazing.—This unit can produce forage for livestock and big game animals for 10 to 15 years after the tree canopy is opened by logging, fire, or some other disturbance. During this period, annual production of forage ranges from 2,000 pounds of air-dry vegetation per acre to less than 50 pounds per acre as the canopy closes.

Recreation.—Most areas of this unit are poorly suited to recreational development. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as recreational sites. If this unit is used for recreational development, the main limitations are dustiness, the hazard of water erosion, and slope. Cuts and fills should be seeded or mulched. Areas used for recreation can be protected from soll blowing and dust by maintaining plant cover.

Homesite development.—Most areas of this unit are poorly suited to homesite development. Included in this unit, however, are areas of more nearly level soils that are more suitable for use as homesites. Onsite investigation is required to identify these areas.

This map unit is in capability subclass VIe and in woodland suitability subclass 1r.

36—Pend Oreitie-Hoodoo elit loams, 0 to 30 percent slopes. This map unit is on mountain foot slopes. Elevation is 2,100 to 3,600 feet. The average annual precipitation is about 32 inches, the average annual air temperature is about 43 degrees F, and the average frost-free period is about 90 days.

This unit is about 50 percent Pend Oreille silt loam, 5 to 30 percent slopes, and 20 percent Hoodoo silt loam, 0 to 2 percent slopes. The remaining 30 percent is included solls. The Pend Oreille soil is in the higher areas and the Hoodoo soil is in swales and depressional areas. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

included in this unit are small areas of Treble gravelly sandy loam and Dufort silt loam on rolling to steep foot slopes; Bonner gravelly silt loam in benchlike areas; Pywell muck, undrained, in wet swales and depressional areas; and Sagle silt loam in concave bowlike areas on toe slopes.

The Pend Oreille soil is very deep and well drained. It formed in glacial till derived dominantly from granitic and metamorphic rock and has a mantle of volcanic ash and loess. Typically, the surface is covered with a mat of needles, leaves, and twigs about 2 inches thick. The surface layer is light yellowish brown, neutral silt loam about 4 inches thick. The subsoil is light yellowish brown, slightly acid silt loam and loam about 13 inches thick. The next layer is pale brown, medium acid and slightly acid gravelly sandy loam about 24 inches thick. The substratum to a depth of 60 inches or more is very pale brown, slightly acid very cobbly sandy loam.

Permeability of this Pend Oreille soll is moderate. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Runoff is medium to rapid, and the hazard of water erosion is high to very high.

The Hoodoo soll is very deep and poorly drained. It formed in alluvium derived dominantly from volcanic ash. Typically, the surface layer is dark grayish brown and light brownish gray, neutral silt loam about 15 inches thick. The upper 37 inches of the underlying material is mottled, white and light gray, neutral and slightly acid silt loam and very fine sandy loam, and the lower part to a depth of more than 60 inches is mottled, light gray, medium acid very cobbly silty clay loam and extremely gravelly silt loam.

Permeability of this Hoodoo soil is moderate to a depth of about 52 inches and moderately slow below this depth. Effective rooting depth is limited by a seasonal

TABLE 6 .-- WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

				Managemen		0	Potential producti	ATEA	
	name and symbol		Erosion  hazard		Seedling  mortal-   ity		Common trees	31te index	Trees to plant
Ardtoo		16	Severe	Severe	Moderate	Moderate	Orand fir	110 105	Douglas-fir, grand fir.
Bonner		20	Slight	Slight	Slight	Moderate	Orand fir	110	Douglas-fir, grand fir, ponderosa pine
Bonner		2r	Severe	Savere	Slight		Orand fir	110	Douglas-fir, grand fir, ponderosa pine
Bonner		10	Slight	Slight	Slight	Severe	Western hemlock Western redoedsr Western white pine Grand fir Douglas-fir Western larch	85 90 125	Western white pine, grand fir, Douglas- fir.
Cabinet		lw	S1 Lght	Moderate	Slight	k i	Western redcedar Western white pine Grand fir Douglas-fir Western larch Yestern hemlock Lodgepole pine	90 90 115	Western white pine, grand fir, Douglas- fir.
Cabinet		1w	Severe	Moderate	Slight		Western redcedar	80 90 120	Western white pine, grand fir, Douglas- fir.
Capehorn	,	lw	Slight	Moderate	Slight	1	Western redoedar Western hemlock Western white pine Orand fir Western larch	85	Grand fir, wostern White pine.
Colburn		1w	Slight	Moderate	Slight		Western reddedar	85 85 	Western white pine, grand fir, Douglas- fir.
O Dufort		10	Severe	Moderate	Slight		Grand fir	115	Douglas-fir, grand fir, ponderosa pine.

See footnote at end of table.

TABLE 7 .-- WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and	Total pr	oddeston	Characteristic vegetation	Compositio
map aymbol	Kind of year	Dry weight	100000000000000000000000000000000000000	- compostoro
		Lh/acre		Pot
6	Payorable	300	Myrtle pachystima	10
Kruse	Normal	250	Longtube twinflower	
ILL USE	Unfavorable	150	Pine readgrass	10
	JOHN BY GUESTE	1,70	Common anowberry	10
	1	i	Qoldthread	5
	1	ĺ	Columbia brome	
	i	i	American trailplant	ź
	1	Í	Baldhip rose	ś
	Ĭ	j	Queencup beadlily	Ŕ
	l	1	Starry Calse-solomons-seal	Ś
	1	1	Sweetscented bedstraw	555555
7		500	Myctle pachystima	15
Kruse Variant	Normal	300	Common beargrass	10
	UnCavorable	100	Queencup beadlily	10
		1	Big blueberry	10
	j.	ļ	Oroundset	5
	\$	Į.	Sitka aldar	5 5 5
	ļ	ļ	Longtube twinflower	5
		ì	Fairybells	5
9 € ;		<u>i</u>	i i	
Lenz		1.000	Common snowberry	15
	Normal	850	Idaho feacue	かいもか かりいか かか
	Unfavorable	500	Bluebunch wheatgrass	5
			Elk sedge	2
			Western fescus	2
		i	Strawberry	2
		i	Heartleaf arnica	2
			Mallow nineback	2
i			White spirea	ź
i		i	Rode	ś
į		1	Blue wildryg	ร์
lock autorop.				
, 30	Favorable	800	Common anowberry	20
	Normal	600	Blue wildrye	10
	Unfavorable	400	Pine reedgrass	10
į.			R048	10
Į.			Bluebunch wheatgrass	5 5
	1/1		Sticky geranium	5
1000 000		1	Saskatoon serviceberry	5
, 32, 33		250	Goldthread	15
	Normal	200 150	Violet	10
-	Unfavorable	130	Piper anemone	10
!		1	Fairyalipper orchid	5
i	1	1	gode	5
			Queencup beadlily	5
í			American trailplant	Ŕ
ĺ	i	1		ś
	1		Fairybells	
)   	Properties			10
		300	Myctle pachystima	10
and Oreilla II	Normal 1	300 200	Myrtle pachystims	5
and Oreilla II		300 200 50	Myrtle pachystima	5
and Oreilla II	Normal 1	300 200 50	Myrtle pachystima	5
end Oreille II	Normal 1	300 200 50	Myrtle pachystima	5
and Oreilla II	Normal 1	300 200 50	Myrtle pachystima	5
and Oreilla II	Normal 1	300 200 50	Myrtle pachystima	5
	Normal 1	300 200 50	Myrtle pachystima	

See footnote at end of table.

# Bonner County Area, Idaho, Parts of Bonner and Boundary Counties

# 10-Dufort silt loam, 5 to 45 percent slopes

#### **Map Unit Setting**

National map unit symbol: 545b Elevation: 2,100 to 3,600 feet

Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 43 to 45 degrees F

Frost-free period: 90 to 110 days

Farmland classification: Not prime farmland

# Map Unit Composition

Dufort and similar soils: 75 percent

Estimates are based on observations, descriptions, and transects of the

#### **Description of Dufort**

# Setting

Landform: Hills, mountain slopes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Mountainflank, side slope

Down-slope shape: Concave Across-slope shape: Linear

Parent meterial: Volcanic ash and/or loess over till derived from

granite and/or gneiss and/or schist

# Typical profile

A - 0 to 13 inches: ashy silt loam
Bt - 13 to 24 inches: gravelly silt loam

2C - 24 to 60 inches: very gravelly sandy loam

# Properties and qualities

Slope: 5 to 45 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat):

Moderately high to high (0.57 to 1.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None Frequency of ponding: None

Available water storage in profile: Moderate (about 6.0 inches)

#### Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: B

Other vegetative classification: grand fir/ninebark (CN506)

Hydric soil rating: No

# **Data Source Information**

Soil Survey Area: Bonner County Area, Idaho, Parts of Bonner and Boundary

Counties

Survey Area Data: Version 11, Sep 8, 2016

# Bonner County Area, Idaho, Parts of Bonner and Boundary Counties

# 35-Pend Oreille silt loam, 5 to 45 percent slopes

#### **Map Unit Setting**

National map unit symbol: 5466 Elevation: 2,000 to 3,600 feet

Mean annual precipitation: 25 to 38 inches Mean annual air temperature: 43 to 45 degrees F

Frost-free period: 70 to 110 days

Farmland classification: Not prime farmland

## **Map Unit Composition**

Pend oreille and similar soils: 70 percent

Minor components: 5 percent

Estimates are based on observations, descriptions, and transects of the

mapunit.

#### **Description of Pend Orellle**

#### Setting

Landform: Mountains

Landform position (two-dimensional): Footslope, backslope

Down-slope shape: Concave Across-slope shape: Linear

Parent material: Volcanic ash and/or loess over till derived from

granite and/or metamorphic rock

#### Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material

A - 2 to 6 inches: ashy silt loam

Bw - 6 to 19 inches: gravelly loam

2Bt - 19 to 43 inches: gravelly sandy loam 2C - 43 to 60 inches: very cobbly sandy loam

#### Properties and qualities

Slope: 5 to 45 percent

Depth to restrictive feature: More than 80 Inches

Natural drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat):

Moderately high to high (0.57 to 1.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None Frequency of ponding: None

Available water storage in profile: Moderate (about 7.1 Inches)

#### Interpretive groups

Land capability classification (irrigated): 7e Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: B

Other vegetative classification: western hemlock/queencup beadlily (CN570)

Hydric soil rating: No

## **Minor Components**

#### Hoodoo

Percent of map unit: 5 percent Landform: Depressions Hydric soil rating: Yes

# **Data Source Information**

Soil Survey Area: Bonner County Area, Idaho, Parts of Bonner and Boundary

Counties

Survey Area Data: Version 10, Sep 9, 2015

**Fiber Rolls BMP 35** 

# Description

A fiber roll (wattle/compost-filled socks) consists of straw, flax, or other similar materials bound into a biodegradable tubular plastic or similar encasing material. When fiber rolls are placed at the toe and on the face of slopes, they intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff. By interrupting the length of a slope, fiber rolls can also reduce erosion.

# **Applications**

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow
- At the end of a downward slope where it transitions to a steeper slope
- Along the perimeter of a project
- As check dams in unlined ditches
- Down-slope of exposed soil areas
- Around temporary stockpiles
- As temporary curbs for conveying water to catch basins and pipe slope
- For catch basin protection

#### Limitations

Drainage area - N/A

Maximum slope - See Design

Minimum water table - N/A

**Parameters** 

Minimum bedrock depth - N/A NRCS soil type - ABCD

Freeze/thaw - good

Drainage/flood control - yes

- Fiber rolls are not effective unless trenched.
- Fiber rolls at the toe of slopes greater than 5:1 (H:V) should be a minimum of 20 in. diameter or installations achieving the same protection (i.e., stacked smaller diameter fiber rolls, etc.).
- Difficult to move once saturated.
- If not properly staked and trenched in, fiber rolls can be transported by high flows.
- Fiber rolls have a very limited sediment capture zone.
- Fiber rolls should not be used on slopes subject to creep, slumping, or landslide.

# **Targeted Pollutants** Design Parameters

#### Sediment

Locate fiber rolls on level contours spaced as follows:

- Slope inclination of 4:1 or flatter: Fiber rolls should be placed at a maximum interval of 20 ft.
- Slope inclination between 4:1 and 2:1: Fiber rolls should be placed at a maximum interval of 15 ft (A closer spacing is more effective.).
- Slope inclination 2:1 or greater: Fiber rolls should be placed at a maximum interval of 10 ft (A closer spacing is more effective.).

# Construction Guidelines

- Fiber rolls should be either prefabricated rolls or rolled tubes of erosion control blanket. Field rolled fiber roll is assembled by rolling the length of erosion control blanket into a tube of minimum 8 in. diameter and binding the roll at each end and every 4 ft along the length of the roll with jute-type twine.
- Turn the ends of the fiber roll up slope to prevent runoff from going around the roll.
- Stake fiber rolls into a 2 to 4 in.-deep trench with a width equal to the diameter of the fiber roll. Drive stakes at the end of each fiber roll and spaced 4 ft maximum on center. Use wood stakes with a nominal classification of 0.75 x 0.75 in. and minimum length of 24 in.
- If more than one fiber roll is placed in a row, the rolls should be overlapped, not abutted.

### Maintenance

- Inspect prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at 2-week intervals during the non-rainy season.
- Repair or replace split, torn, unraveling, or slumping fiber rolls.
- If the fiber roll is used as a sediment capture device, or as an erosion control device to maintain sheet flows, sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-half the designated sediment storage depth, usually one-half the distance between the top of the fiber roll and the adjacent ground surface.
- Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.
- If fiber rolls are used for crosion control, such as in a mini-check dam, sediment removal should not be required as long as the system continues to control the grade. Sediment control BMPs will likely be required in conjunction with this type of application.

Figure 1 - Existing Collection Site



Figure 2 - Upland Drive Facing South

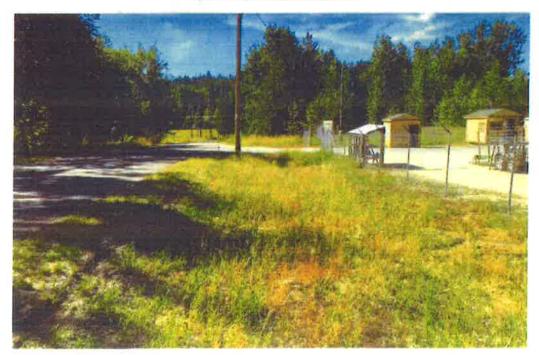


Figure 3 - Location of Proposed Collection Site

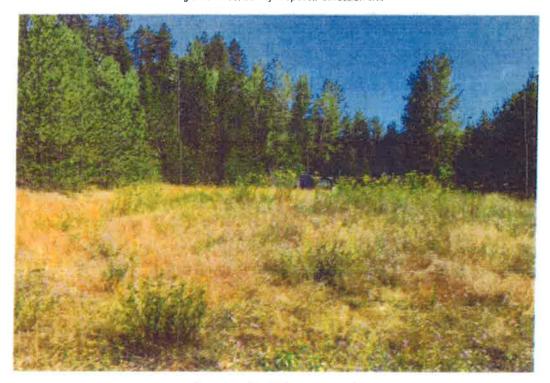


Figure 4 - Upland Drive Facing North



Figure 5 –Area of Apparent Fill



Figure 6 – Rock Outcropping

